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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/775,566	02/10/2004	Fotios Papadimitrakopoulos	UCT-0045	1441
23413	7590	08/10/2005	EXAMINER	
CANTOR COLBURN, LLP 55 GRIFFIN ROAD SOUTH BLOOMFIELD, CT 06002			DRODGE, JOSEPH W	
			ART UNIT	PAPER NUMBER

1723

DATE MAILED: 08/10/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/775,566

Applicant(s)

PAPADIMITRAKOPOULOS,
FOTIOS

Examiner

Joseph W. Drodge

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 21 June 2005.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-23 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-23 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date 0605.
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.

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The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for a patent.

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

Claims 1-4,9,10,19 and 20 are rejected under 35 U.S.C. 102(a or e) as being anticipated by PGPUBS Document US2004/0038251 to Smalley et al (hereafter Smalley) based on provisional application 60/390,887, effective filing date of 06/24/2002.

Smalley discloses suspending a population of mixed single wall nanotubes (SWNT) in a suspending solvent or in a surfactant/solvent mixture, containing mixed *met*SWNT and *sem*SWNT nanotubes, followed by separation steps to separate the types of SWNT, including selective precipitation of *met* or *sem* SWNT, the types of SWNT also having different diameter ranges [as in claim 19], (see page 3, paragraphs 19-24, page 4, paragraph 52 and page 5, paragraph 58, **as well as paragraphs 77-80** of the PGPUBS document/ **and at** page 1, 2nd full paragraph; page 3, 3rd full paragraph, page 4, 2nd full paragraph beginning “the generic...” and page 5, 3rd full paragraph of the provisional application). For claim 19 diameter-based separations are particularly concerned in, ex. page 3, paragraphs 1-3 of the provisional. Prior to separation/precipitation steps, the SWNTs are also functionalized by action of acid or

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base compound and surfactant (page 5, paragraph 60 of PGPUBS document and page 5, paragraph 3 of the provisional).

Regarding claim 2, the SWNTs being of carbon is found at page 1, last paragraph of the provisional and throughout the PGPUBS document.

Regarding claims 3 and 20, temperature change assisted separation steps are found at **paragraph 80 of the Pgpubs document and at** page 5, paragraph 3, lines 4-5 of the provisional.

Regarding claims 4 and 9, use of acids are found at page 7, paragraph 71 of the PGPUBS document and at page 4, paragraph 2, step 2 of the provisional.

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The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

Claims 5-8 and 11-18, **and also 21-23** are rejected under 35 U.S.C. 103(a) as being unpatentable over Smalley et al (Smalley) PGPUBS document US2004/0038251 based on provisional application 60/390,887 giving effective filing date of 06/24/02 in view of Haddon et al patent 6,187,823 (hereafter Haddon).

Claims 5-8, 11 and 14-18, **and claim 21** differ in requiring the surfactant to be an amine. Haddon teaches separation of types of nanotube materials and functionalization of SWNTs by suspension of the nanotube material in organic solvents containing amine surfactants (see especially column 2, lines 9-49; page 6, lines 25-53; column 8, lines 21-23, etc.). It would have been obvious to one of ordinary skill in the relevant arts to have employed an amine compound(s) as the surfactant utilized in the Smalley process, as taught by Haddon, since functionalization with amine-containing groups results which

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produces a wide array of products with distinctive mechanical or electrical properties or with ligands useful in metal complexation.

For claims 6 and 11, **as well as claim 21**, specific amines are detailed by Haddon at column 2, lines 21-29 and column 6, lines 32-43.

Claims 7,12,13 and 15-17, **as well as claims 22 and 23**, differ in requiring the solvent employed to be one of various types of polar or non-polar organic solvent. Haddon also teaches a wide variety of solvents, including polar and non-polar types, ethers, aromatic hydrocarbons, alkyl hydrocarbons, etc. (see column 2, lines 38-46 and 54-65 and also column 3, lines 32-38). It would have been further obvious to one of ordinary skill in the art to have utilized the organic solvents taught by Haddon with the Smalley process/method, to enable a plurality of chemical reactions to occur at the ends of the SWNT molecules tailored to a variety of specific industrial applications.

Applicant should note that various limitations for which Haddon was relied upon, were present in the Smalley PGPUBS document, however, such limitations as particular types of surfactants and solvents employed are not found in the provisional application of Smalley to give a valid effective filing date to anticipate such limitations, hence the reliance upon Haddon for these limitations. **For instance, paragraph 59 of the PGPUBS document lists "polyallyl amine" as a coating and paragraph 60 teaches that such coatings may be surfactants and lists "dodecyltrimethylammonium bromide", which may be considered an amine surfactant, as a possible amine surfactant coating.**

Applicant's arguments filed on June 21, 2005 have been fully considered but they are not persuasive. The majority of the remarks are directed to arguments that Smalley does not disclose nanotube separation being based on selective precipitation or separation based on relative solubilities. However, the last 8 lines of paragraph # 78 of the PGPUBS Document, as well as page 3, paragraph starting "The generic method of separation", especially #4. of such paragraph and page 5, 3rd full paragraph starting "Variations on the preferred mode..." of the Provisional Document discuss details of selective solvent transfer and precipitation of nanotube fractions.

It is also argued that the references do not suggest functionalizing the nanotubes with a surfactant prior to acid functionalization with regard to certain claims. However, page 5, 3rd full paragraph of the Provisional Document relied upon as well as the PGPUBS document at paragraphs 79-81 and 94 disclose pH adjustment by addition of acids and functionalization as by addition of surfactant as being alternative methods or modes of enhancing the separation of semiconducting from metallic nanotubes.

THIS ACTION IS A NON-FINAL

This Office Action remains non-final, since claims 21-23 were not treated in the original Office Action, and since different portions of the PGPUBS Document and Provisional Text of Smalley et al are relied upon.

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Any inquiry concerning this communication or earlier communications from the examiner should be directed to Joseph Drodge at telephone number 571-272-1140. The examiner can normally be reached on Monday-Friday from 8:30 AM to 5:00 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Wanda Walker, can be reached at 571-272-1151. The fax phone number for the examining group where this application is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR, and through Private PAIR only for unpublished applications. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have any questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

JWD

July 8, 2005


JOSEPH DRODGE
PRIMARY EXAMINER